

U.S. Department of Energy

Real World Design Challenge

for high school students

2009

Saturday

Event Book

March 21, 2009

GOVERNMENT & INDUSTRY

PARTNERSHIP

mentorship

real

technology

LEADERSHIP

real



U.S. DEPARTMENT OF
ENERGY

Schedule of Events

Saturday Morning – National 4-H Youth Conference Center

9:00 a.m. – Noon	Design Challenge Presentations <ul style="list-style-type: none">• Group A – <i>Clover Room</i>• Group B – <i>America Room</i>• Group C – <i>Iowa Room</i>
9:00 – 9:35 a.m.	Presentation by Team 1 in each Group
9:40 – 10:15 a.m.	Presentation by Team 2 in each Group
10:15 – 10:30 a.m.	<i>Break</i>
10:30 – 11:05 a.m.	Presentation by Team 3 in each Group
11:10 – 11:45 a.m.	Presentation by Team 4 in Group A
Noon – 1:15 p.m.	Lunch – Clover Cafe
1:30 – 2:45 p.m.	Speakers – Clover Room
1:30 – 2:05 p.m.	Paul Kostek, Principal, Air Direct Solutions
2:10 – 2:45 p.m.	Amanda Bligh, Implementation Engineer, APriori Technologies, Inc.
2:45 – 3:00 p.m.	Top 3 Teams Announced – Clover Room
4:30 – 5:30 p.m.	Dinner for Teams – Clover Cafe

Saturday, March 21, 2009

Saturday Evening – National Air and Space Museum

6:30 p.m.	Guest Arrival and Registration – Mission Hall
7:00 p.m.	Teams, Judges and Guests are seated in the IMAX Theater
7:05 p.m.	Welcome to The National Air and Space Museum – IMAX Theater Peter Jakab, Chairman, Division of Aeronautics, National Air and Space Museum, Smithsonian Institution
7:10 – 8:40 p.m.	Final Three Team Presentations – IMAX Theater (<i>in alphabetical order</i>)
7:10 – 7:40 p.m.	• Team A
7:40 – 8:10 p.m.	• Team B
8:10 – 8:40 p.m.	• Team C
8:40 p.m.	Judges are dismissed to the “Ready-Room”
8:40 – 9:15 p.m.	Reception for Teams and Guests – Space Hall
9:15 – 9:45 p.m.	Awards Ceremony – America by Air Hall Master of Ceremonies: Phillip Niedzielski-Eichner, Senior Program Manager/Science & Technology Policy, TechSource Incorporated Keynote Address: Bill Valdez, Director, U.S. Department of Energy, Office of Workforce Development for Teachers & Scientists Evening Honorees: <ul style="list-style-type: none">• Sponsors:<ul style="list-style-type: none">– Business Development Group– Education Development Group– Federal Aviation Administration• Partners:<ul style="list-style-type: none">– Cessna Aircraft Company– Parametric Technology Corporation• The Ten RWDC Inaugural States• Announcement of the Top Three Teams
10:00 p.m.	Event concludes

Saturday Morning **Judges**

▶ **Mark Beyer**

Title: Senior Engineer Specialist
Engineering Analysis Processes

Organization: Cessna Aircraft
Company

▶ **Ray Girardo**

Title: Vice President of
Product Development

Organization: Cessna Aircraft
Company

▶ **Josh Huston**

Title: Engineer, Sovereign

Organization: Cessna Aircraft
Company

▶ **Dr. Wilson N. Felder**

Title: Director

Organization: Federal Aviation
Administration, William J.
Hughes Technical Center

▶ **Steve Flanagan**

Title: Aerospace Engineer

Organization: Federal Aviation
Administration

▶ **Norm Pereira**

Title: Aerospace Engineer
(Electrical Systems)

Organization: Federal Aviation
Administration

▶ **Mary Ellen Schutt**

Title: Manager of the Airframe
& Administrative Branch
of the Chicago ACO

Organization: Federal Aviation
Administration

▶ **Dr. Lloyd Griffiths**

Title: Dean, Volgenau School
of Information Technology
and Engineering

Organization: George Mason
University

▶ **Matthew Leatherman**

Title: Senior Systems Engineer

Organization: Lockheed Martin
Company

► **Dustin Sheffield**

Title: Mechanical/Radar –
Engineering Leadership
Development Program
Organization: Lockheed Martin
Company

► **Matt Veldhuis**

Title: Staff Systems Engineer
Organization: Lockheed Martin
Company

► **Dr. Curtis Marshall**

Title: Program Officer,
Board of Atmospheric
Sciences and Climate
Organization: National Academies
of Sciences

► **Dr. Ben D. Latigo**

Title: Dean of the School of
Engineering and Applied Sciences
Organization: University of
the District of Columbia

► **David Koegel**

Title: Program Analyst,
Technology Transfer
Organization: U.S. Department
of Energy, Office of Science

► **Ray Ng**

Title: Program Manager
Organization: Sandia National
Laboratory, U.S. Department
of Energy

► **Kevin Shaw**

Title: Program Analyst
Organization: U.S. Department
of Energy, Office of Science,
Office of the Deputy Director
for Science Programs

Speakers

Paul J. Kostek

Engineering the World - Finding Your Place



Paul will talk about his career as an engineer, the different engineering disciplines, what students should study to prepare for college, where engineers work, and what the current and future opportunities for engineers will be.

Paul J. Kostek is a Principal Systems Engineer with Physio Control Corporation. He is also a Principal of Air Direct Solutions, a systems engineering/project management consulting firm. He works with companies in defining system architecture and design, system requirements, and software development standards. Paul received his BSEE from the University of Massachusetts, Dartmouth, in 1979.

Paul is the Vice President of Communications and Public Awareness for the Institute of Electrical and Electronics Engineers (IEEE-USA). He also served as the Vice President of Career Activities in 2007 and has chaired the IEEE-USA Communications Committee and the Career and Workforce Policy Committee. Paul was the 2003 Chairman of the American Association of Engineering Societies. In 1999, Paul was the President of IEEE-USA, and a member of the IEEE Board of Directors. He has also served as President of the IEEE Aerospace & Electronics Systems Society and was a Director of the Washington Aerospace Alliance (PNAA.net). He was the 2002 President of the Seattle Metro Chapter of INCOSE and 2006 Chair of the Pacific Northwest Section of AIAA. Paul chaired the 2004 IEEE Intelligent Transportation Systems Conference and the 2006 IEEE/AIAA Digital Avionics Systems Conference.

Paul is a Senior Member of the IEEE, an Associate Fellow of the American Institute of Aeronautics and Astronautics, and a member of the International Council on Systems Engineering, SAE, and the Project Management Institute.



Amanda Bligh

Realities of Product Development

Being a design engineer is great! I get to design cool stuff! And use math! And CAD! But my manufacturing engineer keeps coming back and saying this product can't be made and marketing keeps coming back and saying it is too expensive. And now the product is late! And a customer got hurt! How do I avoid these pitfalls so I can still deliver on time? Amanda Bligh will describe some real-life situations from her experiences and engineering tools that can be used to avoid trouble spots.

Amanda Bligh's professional background is in design and manufacturing. Her design experience started with CAD in high school and continued through an undergraduate degree in mechanical engineering from MIT. She was first exposed to the realities of product design and manufacture at Hasbro, where she worked as a Product Engineer on the Nerf and Super Soaker brands. While at Hasbro, Amanda expanded her knowledge of manufacturing and the product development process with a Master's degree in manufacturing engineering from the University of Rhode Island.

She currently works for aPriori where she customizes models of customers' manufacturing systems so they can determine the cost of their parts before production. Amanda also enjoys traveling, playing basketball, participating in martial arts and reading anything she can get her hands on.

Master of Ceremonies

Phillip A. Niedzielski-Eichner



Mr. Phillip Niedzielski-Eichner is currently serving in his second four-year term as an elected member of the 12-member School Board of the Fairfax County, Virginia public school system. The nation's 12th largest school system, Fairfax serves 170,000 students, is highly diverse, and is internationally recognized for its educational quality. Mr. Niedzielski-Eichner has served both as School Board and Budget Committee Chairman.

Professionally, Mr. Niedzielski-Eichner is Science and Technology Policy Director for TechSource, Inc. He is a specialist in nuclear security and nuclear energy policy, including matters related to the nuclear fuel cycle, nuclear weapons maintenance and dismantlement, environmental stewardship, and nuclear materials disposition. He maintains functional expertise in strategic planning, business process reengineering, change management, organization development, policy negotiation, and dispute resolution.

Mr. Niedzielski-Eichner recently completed his appointment as a member of President Obama's U.S. Department of Energy (DOE) Agency Review ("Transition") Team, where he focused on national nuclear security and nuclear fuel cycle matters. He was also the named lead for the Nuclear Regulatory Commission (NRC) review.

Previously, Mr. Niedzielski-Eichner served in the Clinton Administration under DOE Secretaries Federico Peña and Bill Richardson, ending his appointment as Director of Nuclear Materials Management Policy.

Before entering federal service, Niedzielski-Eichner founded and served as President and CEO of Governmental Dynamics, Inc. He was a founder and the first Executive Director of the Energy Communities Alliance. He has served on a number of national advisory committees, including: the Environmental Protection Agency's (EPA) Federal Facilities Environmental Restoration Advisory Committee; EPA's National Advisory Council for Environmental Policy and Technology's Subcommittee on Radiation Cleanup Standards; and the NRC's Workshops on Radiological Criteria for Decommissioning.

Saturday Evening **Distinguished Judging Panel**



Dave Brant

Senior Vice President, Product Engineering, Cessna Aircraft Company

Dave Brant is Senior Vice President, Product Engineering for Cessna Aircraft Company, the leading worldwide manufacturer of general aviation aircraft. In this position since 2004, he is responsible for new aircraft, development, and certification, as well as engineering product support for all aircraft in production and in service.

Dave joined Cessna in 1974 and served in various engineering capacities in design and flight test until 1980. He served as Chief, Flight Test for Piper Aircraft and various engineering and management positions at Learjet where he ultimately became Vice President, Strategic Planning and New Business Development. Dave also served as Senior Vice President, Operations for Galaxy Aerospace before rejoining Cessna in 2001 as Director, Airworthiness, Engineering Flight Test and Product Safety.

Dave has his Airline Transport Pilot (ATP) and multi-engine license. He is rated in various Citations and has more than 2,800 hours of flight time. Dave is a certified Textron Six Sigma Green Belt, has a Bachelor's degree in aeronautical technology from Arizona State University, and an M.S. in management from Friends University.

Mary Cleave, Ph.D., P.E.

Retired, National Aeronautics and Space Administration (NASA)

Mary L. Cleave, Ph.D., P.E., retired from NASA as the Associate Administrator for Science in 2007 at NASA Headquarters in Washington, DC. She served at NASA's Goddard Space Flight Center in Greenbelt, MD from 1991–1999, where she worked as the project manager for SeaWiFS (Sea-viewing, Wide-Field-of-view-Sensor), an ocean color instrument on a spacecraft that monitors vegetation globally. She managed the project during the development and early operational phase. Cleave flew as a mission specialist aboard STS-61B in 1985 and STS-30 in 1989, both aboard the Shuttle *Atlantis*. She also served in a range of technical and engineering capacities supporting the shuttle program, including CAPCOM (capsule communicator) for five shuttle flights.

Cleave is the recipient of numerous awards, including the American Astronautical Society Flight Achievement Award, 1989; NASA Exceptional Achievement Medal, 1994; Friend of Mongolia, 1995; and NASA Engineer of the Year, 1998. Her first solo flight was aboard a Cessna 150 at the age of 16 and she qualified as a private pilot at 17.



Saturday Evening **Distinguished Judging Panel**



Dr. John D. Evans

Vice President, Business Innovation, Lockheed Martin Corporation

Dr. John Evans is Vice President, Business Innovation for Lockheed Martin Corporation. He is responsible for driving innovative concepts linking technology, business, and strategy across all Business Areas while identifying and developing new lines of business.

Before joining Lockheed Martin, Dr. Evans served as a Program Manager for the Defense Advanced Research Projects Agency. Working predominantly with the Microsystems Technology Office and the Virtual Space Office, he envisioned, sold, and successfully led revolutionary programs for the radio frequency systems (RF), space propulsion, nuclear power, and Micro Electromechanical Systems (MEMS) areas.

Dr. Evans earned a B.A. degree in physics from Carleton College; an M.S. degree in civil engineering and a Ph.D. in mechanical engineering from the University of California, Berkeley; and an M.B.A. from Duke University. Dr. Evans serves as a member of the University of California Berkeley External Advisory Board for the Department of Mechanical Engineering. He is an inventor on nine issued United States patents.

Joyce Malyn-Smith, Ed.D.

Strategic Director of Workforce and Human Development, Education Development Center (EDC)



Dr. Malyn-Smith is a Strategic Director of Workforce and Human Development for EDC's Education, Employment, and Community Programs leading technology projects of national significance. She is the Principal Investigator for National Science Foundation's National Learning Resource Center and also serves as Principal Investigator of the NSF-ATE funded IT Across Careers projects, which have articulated the IT skills used in the 16 clusters, developed lessons on integrating IT skills into career programs for community college faculty, and used rubrics to assess basic technology skills. She leads EDC's Power Users of Technology Initiative, a research effort to learn from and with children who have had intensive and long-term experiences with technology.

A graduate of Boston University and Universidad Interamericana, she joined EDC after 23 years with Boston Public Schools as educator and Program Director for Occupational Instructional Design, leading curriculum, professional development and program evaluation for more than 40 city-wide career programs.



Robert E. Mansfield, Jr.

Brigadier General, USAF, Retired

Robert Mansfield is the Director, National Center for Aerospace Leadership (NCAL) and Principle Investigator, National Aerospace Leadership Initiative (NALI) at the Connecticut Center for Advanced Technology (CCAT) in East Hartford, CT. The NALI is an Air Force funded initiative focusing on the critical role of the U.S. manufacturing supply chain in the aerospace industry. NCAL is developing innovative technology and process applications in the areas of next generation manufacturing, modeling and simulation, and workforce development for small to medium aerospace manufactures and the USAF's logistics/sustainment capabilities at the Air Logistics Centers.

Prior to joining CCAT, Mr. Mansfield was Lockheed Martin Aeronautics' Director of Global Supply Chain Services. Previously he was the Director of Global Sustainment for the Joint Strike Fighter (JSF).

Mr. Mansfield is a retired Air Force Brigadier General, with 34 years experience in logistics planning, operations, and supply chain management. He holds a B.S. degree from the University of Arizona in business administration, and an M.S. degree from the Air Force Institute of Technology in acquisition logistics management.

Dr. Donald Senich

Senior Advisor/Industrial Innovation and Partnerships
Directorate for Engineering, National Science Foundation (NSF)



Dr. Donald Senich is a Senior Advisor for the Division of Industrial Innovation and Partnerships, Directorate for Engineering, NSF. He is responsible for implementing academic/industrial collaborative research programs in the Engineering Directorate of approximately \$34 M. He has also been responsible to the Director, NSF, for procurement interface and actions with the Small Business Administration's Office of Government Contracting.

He has been the Program Director for the Grants Opportunity for Academic Liaison with Industry; Director, Office for Small Business Research and Development; and Director, Office of Small and Disadvantaged Business Utilization.

Dr. Senich completed his undergraduate work at the U.S. Military Academy and University of Notre Dame (B.S., mechanical engineering), and his graduate education at Iowa State University (M.S., civil engineering) and Iowa State University (Ph.D., civil engineering). He completed additional graduate work at the Colorado School of Mines and Goethe University in Germany.

Saturday Evening continued **Distinguished Judging Panel**



John D. Stuart

Senior Vice President, Global Education, Country Manager,
Parametric Technology Corporation (PTC) Eastern Europe S.R.L.

John Stuart is the Senior Vice President of Education and Country Manager of PTC Eastern Europe at PTC. He provided the vision and guidance in developing PTC's award winning, internationally recognized education program, which provides complete learning solutions that not only inspire a new generation to succeed in a technological world, but also prepares the engineers of the future.

PTC recently announced that John became the Country Manager of PTC Eastern Europe S.R.L. This initiative is part of PTC's globalization plan and will involve John's relocation to Eastern Europe to establish PTC's presence within the region. Over the 17+ years he has been at PTC, he has held several senior level positions within the sales, marketing, and alliance partner organizations.

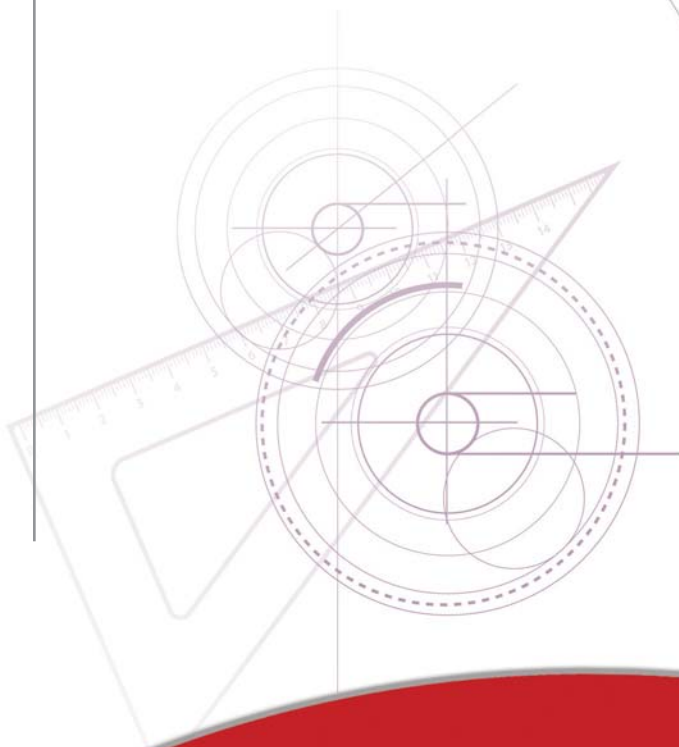
John currently serves as Co-Chairman of the University of Massachusetts Mechanical and Industrial Engineering Industry Advisory Board, and the American Society of Engineering Educators K12 advisory board. He is a 1979 graduate of the University of Illinois with a degree in finance.

What are the Judges Looking For?

This evening, three student teams will present solutions to an aerodynamic design problem. Briefly stated, the teams were asked to use CAD software and virtual wind tunnel testing to design a wing that would operate at an altitude of 37,000 feet and a cruise speed of Mach 0.95. Their design goal was to minimize the drag acting on the wing while meeting specific lift requirements.

The evaluation of these student presentations will focus on the following six questions:

- 1 Does the team clearly describe their design process and the development of their winning solution “strategy”?
- 2 Does the team clearly show the importance of repeated testing and ongoing modification to the design process?
- 3 Does the team clearly communicate the variables incorporated into the final design and a sound technical basis for the final choices made?
- 4 Does the team present their information in a manner that is logically structured, entertaining, and convincing?
- 5 Does the team reveal an innovative approach to the design process and the development of an innovative solution to the National Challenge Problem?
- 6 What is the overall quality of the solution that the team is presenting to the National Challenge Problem?



Participating Teams

Real World Design Challenge 2009

Connecticut

Kennedy High School,
Waterbury

Hawaii

Iolani School,
Honolulu

Kansas

Baldwin High School,
Baldwin City

Massachusetts

Newburyport High School,
Newburyport

Minnesota

Hutchinson High School,
Hutchinson

Oklahoma

Francis Tuttle Technology
Center, Oklahoma City

Pennsylvania

Cumberland Valley
High School,
Mechanicsburg

Vermont

South Burlington
High School,
South Burlington

Virginia

Giles County Technology
Center, Pearisburg

Washington

Kamiakin High School,
Kennewick

Thank You

- ▶ American Institute of Aeronautics and Astronautics
- ▶ Cessna Aircraft Company
- ▶ Education Development Center
- ▶ Federal Aviation Administration
- ▶ The Institute of Electrical and Electronics Engineers
- ▶ Lockheed Martin Corporation
- ▶ National Aeronautics and Space Administration
- ▶ The National Aerospace Leadership Initiative
- ▶ National Air and Space Museum
- ▶ National Science Foundation
- ▶ Parametric Technology Corporation
- ▶ Sandia National Laboratories
- ▶ U.S. Department of Energy, Office of Science



U.S. DEPARTMENT OF
ENERGY